

Functional biases in acquisition: Language learners restructure their input to reduce uncertainty

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Abstract

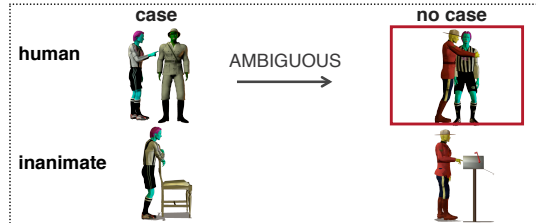
Languages around the world share striking commonalities. Functional approaches argue that grammatical structures that facilitate processing and communication are more likely to persist cross-linguistically [1, 2]. By what means functional pressures may come to shape grammar over time, however, remains unknown. In two artificial language learning experiments, we explore the possibility that functional pressures operate during language acquisition, biasing learners to deviate from the input they receive. In particular, we investigate whether language learners have a bias against excessive uncertainty about the intended meaning.

The Phenomenon

Differential case-marking cross-linguistically

- found in natural languages (e.g., Sinhalese, Hindi)
- governed by several hierarchies [3, 4]:
 - person
 - definiteness
 - animacy: human > animate > inanimate**

more likely to be a subject ← → more likely to be an object



Experiment 1: Optional object-marking

An artificial language learning study

- tested 20 monolingual native English speakers
- 4-day procedure

Input Grammar

Word Order	Object case-marked?	Animacy of object
SOV (60%)	60%	human (50%)
OSV (40%)		inanimate (50%)

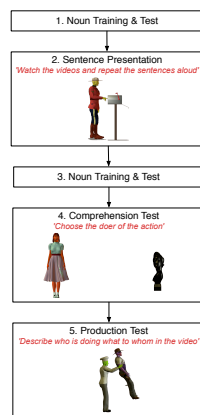
Input Lexicon

Object noun: 5 human, 5 inanimate
Subject noun: 5 human
Verb: 8 transitive
Case-marker: kah

Analysis

The data was analyzed using mixed logit models [5] with the maximum random effect structure justified by the data. All effects reported below are significant at $p < 0.05$ on the final day of training (unless indicated otherwise) while controlling for other factors.

Procedure



Results

Fig. 1: Object-marking is sensitive to animacy

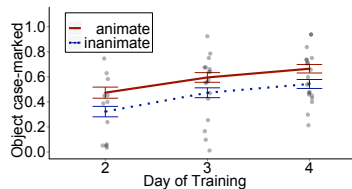
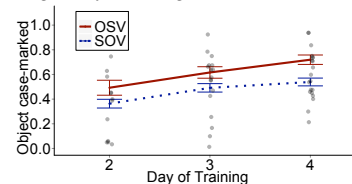


Fig. 2: Object-marking is sensitive to word order



Experiment 2: Optional subject-marking

Input Lexicon

Subject noun: 5 human, 5 inanimate
Object noun: 5 inanimate
Verb: 8 transitive
Case-marker: kah

Input Grammar

Word Order	Subject case-marked?	Animacy of subject
SOV (60%)	60%	human (50%)
OSV (40%)		inanimate (50%)

Participants

- 20 monolingual native English speakers

Goals

- Is the higher proportion of case-marker use in Exp. 1 due to a bias to mark the atypical as hypothesized and not to certain properties associated with animacy?
- Is differential case-marker use across word orders driven by a bias to mark the atypical (marked word order) or by a bias to provide disambiguating information as early as possible?

Results

Fig. 3: Subject-marking is sensitive to animacy

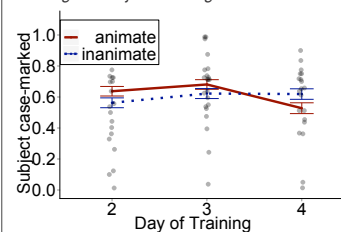
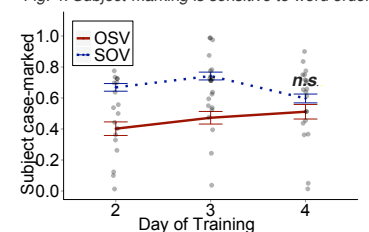


Fig. 4: Subject-marking is sensitive to word order



Discussion

1. Language learners have a bias against excessive uncertainty in form-meaning mapping and restructure the input they receive to reduce this uncertainty.

- Learners use more overt case-marking when referents occur in their atypical positions, i.e., when the uncertainty about the intended meaning is highest.

2. This behavior cannot be explained by native-language bias since learners induce a structure into the language they learn that is not present either in the input or their native language.

3. Learning biases mirror typologically frequent patterns (see also [6, 7, 8]) as well as [9] for a recent review) such as differential case-marking systems and *can thus offer an account of some of the structural similarities found in natural languages.*

References

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